Airwave

Gliders for pilots who want just the best

Airwave Tandem 2 Owners Manual

Tandem 2 Owners Manual

Airwave is a world leader in the design and production of paragliders. For many years Airwave have developed products with world beating performance for pilots who want the best. We apply our competitive knowledge to design top quality products that combine the highest performance with the safe handling our customers value and respect. Airwave pilots confide on our quality and reliability.

Airwave´s world class status is based on the skills and expertise we have developed in combining aerodynamic design, cloth and materials technology. All Airwave products are developed and made with the same skill and attention to good design that are synonymous with the ultimate performance and precision required by airports.
The Tandem 2 is part of the wide range of Airwave flying equipment.

Congratulations on your purchase of the Airwave Tandem 2.

The Tandem 2 is a Tandem paraglider, designed to a high standard of safety and stability, but it will only retain these characteristics if it is properly looked after. Please read this manual carefully from the first to the last chapter to ensure you get the best out of your Tandem 2.
This manual has been prepared to give you information and advice about your paraglider. If you ever need any replacement parts or further information, please do not hesitate to contact your nearest Airwave dealer or contact Airwave directly.

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Chapter I

Introduction & Data

The Tandem 2 is a Tandem paraglider suitable for any competant pilot. Positive handling and turn coordination combined with an excellent glide and sink rate make this a wing which is real pleasure to fly.

Tandem 2	
Linear Scaling factor	1
Projected Area (Sq m)	35.81
Flat Area (Sq m)	41.45
Weight excl bag (Kg)	7.9
Total Line length m	506
Height (m)	9.18
Number of main lines (A/B/C/D)	3/4/3
Chambers/Cells	75/53
Flat Aspect Ratio (m)	5.3
Projected aspec ratio (m)	3.98
Root Cord (m)	3.43
Flat span (m)	14.82
Projected span (m)	11.94
Weight Range (kg)	130-230
Trim Speed (km/h)	40 – 48
Top Speed (km/h)	54
Best glide	8.8
Min sink (m/sec)	1.1
Certification	EN-B

The use of this glider is limited to non aerobatic manueuvres.

This paraglider must not:

1) be flown with more than maximum certified total load.
2) have its trim speed adjusted by changing the length of risers or lines.
3) exceed 60 degrees of bank angle.
4) be fitted with auxiliary power unless designed, installed and tested by the factory.
5) be flown in rain or snow.
6) be towed with a tow line tension in excess of 100 kg.

It is your dealer´s responsibilities to test fly the paraglider before you receive it. The test flight record of this is on the last page of this manual. Please be sure that your dealer to prove that he has done this has completed this. Failure to test fly a new paraglider may invalidate any warranty.

Chapter II

Preparation

1) Please ensure that your equipment is suitable for Tandem 2 flying and is complete. The risers of the Tandem 2 should be attached by suitable karabiners or steel maillons to the spreader bars which must be the correct way round. The spreader bars must be attached to the risers so that the pilot's hang position (the shorter one) is at the back (below the D riser) and consequently the passenger's hang points will be at the front (below the A risers). It is recommended that the pilot's harness be fitted with a Tandem 2 reserve, which should be attached to the main karabiners to which the canopy is attached.

2) Select a suitable take-off area determined by wind and terrain, clear of any obstacles that may catch in the lines or damage the canopy. If your paraglider has been correctly packed, you should take it to the top of the take-off area, and allow the rolled canopy to unroll itself down the hill (if on a slope). This should leave the paraglider with the bottom surface facing upwards, the openings at the downwind end of the take-off area, and the harness at the trailing edge at the upwind side. The trimmers should be released on both risers to the fastest setting.

3) Unroll the canopy to each side so that the leading edge openings form a semi-circular shape, with the trailing edge drawn together as the centre of the arch. The harness should be drawn away from the canopy until the suspension lines are just tight.

Chapter III

Pre-flight Inspection

The Tandem 2 is designed to be as simple as possible to inspect and maintain but a thorough pre-flight procedure is mandatory on all aircraft. The following pre- flight inspection procedure should therefore be carried out before each flight.

1) Whilst opening out the paraglider check the outside of the canopy for any tears where your paraglider may have been caught on barbed wire or even have been damaged whilst in its bag.

2) Check that the lines are not twisted or knotted. Divide the suspension lines into six groups, each group coming from one riser. By starting from the harness and running towards the canopy remove any tangles or twists in the lines. Partially inflating the canopy in the wind will help to sort out the lines.

3) It is particularly important that the brakes are clear and free to move. Check the knot, which attaches the brake, handles to the brake lines. Several knots should be used here or they may get entangled in the brake pulleys. Both brakes should be the same length and an assistant holding the upper end of the brake lines together can check this, whilst the pilot holds the brake handles. The length of the brake lines should be such that they are just slack with the wing inflated when the brakes are not applied. After checking the brake lines lay them on the ground.

4) Always check the buckles and attachments on the harness. Ensure the two main attachment maillons/karabiners from the harness to the main risers are tightly done up, as well as the six shackles which attach the risers to the lines.

5) Before the pilot and passenger are attached to their harnesses they should be wearing a good crash helmets, and boots which provide ankle support. Put on the harness ensuring all the buckles are secure and properly adjusted for comfort. Your paraglider is now ready for flight.

Chapter IV

Flight Characteristics

This manual is not intended as an instruction book on how to fly the Tandem 2, you should be a qualified pilot or under suitable supervision, but the following comments describe how to get the best from your Tandem 2.

Active Piloting

Active piloting is flying in empathy with your paraglider. This means not only guiding the glider through the air but also being aware of feedback from the wing, especially in thermals and turbulence. If the air is smooth the feedback can be minimal but in turbulence feedback is continuous and needs to be constantly assessed by the pilot through the brakes and the harness. Such reactions are instinctive in good pilots. Maintaining contact with the glider through pressure on the brakes is essential and allows the pilot to feel the loss of internal pressure which often precedes a collapse. The Tandem 2 is highly resistant to collapse without any pilot action at all, but learning how to fly actively will increase this safety margin even further.

Harness

The Tandem 2 is tested with a standard harness and it is easy to fly with weight shift. Harnesses with cross straps are not recommended by the manufacturer.

Take-off

The Tandem 2 is easy to inflate in light or stronger winds and will quickly rise overhead to the flying position. The best inflation technique is to hold one A riser in each hand. The `baby A' risers should be held as well as the A risers and it is for this reason that the A and the baby A are attached together with Velcro and also why both have a red cloth wrap around the top of these two risers. For launch always ensure the trimmers are released.

a) ***Nil Wind*** – In nil or very light wind, stand with all the A lines tight behind you, then take one or two steps back (do not walk all the way back to the canopy) and then begin your launch run pulling gently and smoothly on the A risers. As soon as the canopy starts to rise off the ground stop pulling so hard on the A risers but pull all the risers evenly through the harness. Maintaining gentle pressure on the A risers always helps in very calm conditions. Have your hands ready to slow up the canopy with the brakes it starts to accelerate past you.

b) ***Reverse Launch*** – In winds over 10 km/h it is probably better to do a reverse launch and inflate the canopy whilst facing it using the A risers.

The Tandem 2 has almost no tendency to overshoot but releasing pressure on the A risers when the canopy has risen about 45° will help to prevent this. The stronger the wind and the greater the pressure on the A riser the more quickly the canopy will rise.

Turning

The Tandem 2 does not require handed approach to manoeuvring. For a fast turn smoothly apply the brake on the side to which the turn is intended. The speed with which the brake is applied is very important. If a brake is applied fairly quickly the canopy will do a faster banking turn, but care must be taken not to bank too severely. To attain a more efficient turn at minimum sink, apply some brake to the accelerating wing to slow the turn and prevent the wing from banking. The Tandem 2 flies very well like this, but care must be taken not to over-apply the brakes as a spin could result. The Tandem 2 will turn far more efficiently if the pilot weight-shifts into the turn in the harness. Remember that violent brake application is dangerous and should always be avoided.

Straight Flight

The Tandem 2 will fly smoothly in a straight line without any input from the pilot. With a pilot and passenger weight together of 150 kg and the trims released the flying speed will be approximately 40 km/h.

Thermalling

To attain the best climb rate the Tandem 2 should be thermalled using a mild turn, as described above, keeping the wing´s banking to a minimum. In strong thermals a tighter banking turn can be used to stay closer to the thermal´s core. Remember that weight shifting in the harness will aid the efficiency of the turn and reduce the amount of brake required. The turning is also helped greatly if the passenger also assists by weight shifting.
Care must be taken not to apply so much brake as to stall, this is however very easy to avoid as the brake pressure increases greatly as you approach the stall point. Only fly near the stall point if you have enough height to recover (100 m).

Wing Tip Area Reduction (Big Ears)

The span wise line layout allows the Tandem 2 to be "big eared" without modification. The big ear facility does not allow you to fly in stronger winds, but is a facility, which allows the pilot to descend quickly without substantially, reducing the forward speed of the canopy. To engage big ears the pilot will need to lean forward in the harness and grasp the baby A risers (one in each hand) at the maillon if he can reach that high, keeping hold of both brake handles if possible. Pull the Baby A risers out and down at least 30 cm so as to collapse the tips of the glider. It is very important that you are using the correct risers when doing this manoeuvre so the other A lines are not affected as this could cause the leading edge to collapse. Steering is possible by weight shifting with big ears in. If the big ears do not come out quickly own a pump on the brakes will speed things up.

Before using the big ears facility in earnest it is essential to practice beforehand with plenty of ground clearance in case a leading edge collapse occurs. Always keep hold of both brakes in order to retain control. Putting your hands through the brake handles so they remain on your wrists is a good method of doing this.

B-Line Stall

This is a fast descent method and is a useful emergency procedure. With both hands through the brake handles, the pilot takes hold of the top of the B risers, one in each hand, and pulls them down by around 50 cm. When Tandem 2 this is very difficult to do, and the pilot may require the help of the passenger in order to achieve this manoeuvre, especially if the passenger is heavier than the pilot. AB-line stall will stall the canopy and forward speed will drop to zero. Make sure you have plenty of ground clearance because the decent rate can be over 10 m/sec. To increase the descent rate pull harder on the B riser. When you release the B riser the canopy will automatically start flying again, normally within two seconds. Sometimes the canopy will turn gently when it exits from the B line stall. It is normally better to release the B riser fairly quickly rather than slowly as this may result in the canopy entering deep stall. Always release the riser symmetrically as an asymmetric release from a B line stall may result in the glider entering a spin. This manoeuvre is useful when losing a lot of height quickly is necessary, perhaps when escaping from a thunderstorm. It should not be performed with less than 100 m of ground clearance. (see also Chapter V, part1)

Spiral Dive

A normal turn can be converted into a strong spiral dive by continuing to apply one brake. The bank angle and speed of the turn will increase as the downward spiral is continued. Be careful to enter the spiral gradually as too quick a brake application can cause a spin.
Care should be taken when exiting from a spiral dive. Too pull out of a steep spiral dive always release the applied brake gradually. A sharp release of the brake can cause the glider to surge and dive as the wing converts speed to lift. Always be ready to damp out any potential dive with the brakes. A spiral dive should not be confused with a spin.
It is recommended that when you exit from a severe spiral dive that you turn in the opposite direction in order to avoid flying back into your own tip vortex, which can sometimes cause an unexpected and violent collapse.

Trimmers

The Tandem 2 is sold with special trimmers on the risers and a spare set of trim tabs, which can be replaced easily when the original pair become worn due to excessive use.
Launching and landing is normally done with the trimmers in the middle position

so that the risers are all of equal length. The glider will come up easier in this configuration.In order to reduce the brake pressure in flight the trimmers can be applied to the slowest position. Try to avoid using the slowest trimmer position if you are flying near the bottom of the weight range (below 150kg all up weight). If you are near the top of the weight range (over 200kg all up weight) it is better to always fly with the trimmers applied, except for the take-off. Flying with the trimmers in the slow (applied) position helps to reduce the brake pressure and makes flying with heavier weights nicer. The trimmers have a recommended weights and trim positions printed on them to show the pilot the ideal. The glider is certified for all weights and all trimmer positions so these weight guides are simply a recommendation for best use of the glider.

- Check the component parts at regular intervals for wear and tear and ensure that the system always works smoothly.

Landng

Landing the Tandem 2 is very straightforward. Flare the Tandem 2 in the normal way from an altitude of around 2 m when landing in light winds. It may sometimes help to take wraps on the brakes to make the flare more effective, and use the pendulum effect of the glider to give a perfect stand up landing in light winds. Trimmers should be in the middle position.

Chapter V

Recovery Techniques

Stalls

These manoeuvres are dangerous and should not be practised in the course of normal flying. Stalls are caused through flying too slowly. Airspeed is lost as brake pressure increases and as the canopy approaches the stall it will start to descend vertically and finally begin to collapse. Should this occur it is important that the pilot release the brakes at the correct moment. The brakes should never be released when the wing has fallen behind the pilot. When releasing the brakes it is best not to release them too quickly. This is in order to prevent the forward surge of the canopy when it recovers from the stall. If you do release the brakes quickly you should brake the canopy strongly during the surge forward, to stop the dive. All pilots who fly the Tandem 2 are advised never to attempt this manoeuvre unless under SIV training. This manual is not provided to give instruction in this or any other area.

Deep Stall (or Parachutal)

The Tandem 2 has been designed so that it will not easily remain in a deep stall.However if the Tandem 2 is incorrectly rigged or is flying characteristics have been adversely affected by some other cause, it is possible that the paraglider could enter this situation. Therefore in the interests of safety all pilots should be aware of this problem, and know how to recover from it. The most common way to enter deep stall is from a flying too slowly, from a B line stall or even from big ears.
When in deep stall the pilot will notice the following:
(*) Very low airspeed
(**) Descent is almost vertical (like a round canopy) and is typically 5m/sec.
(***) The paraglider appears quite well inflated but does not have the full internal pressure. It therefore appears and feels a bit ´limp´.

Recovery from deep stall is quite simple.

The normal method is to simply imitate a mild turn. As the canopy starts to turn it will automatically change to normal flight, but it is very important not to turn too fast as this could induce a spin.
The second method to exit from deep stall is to pull gently on the A risers. This helps the airflow to re-attach to the leading edge, but care should be taken not to pull down too hard as this will induce a front collapse. If the deep stall is particularly stubborn and the previous methods do not work then a full stall will solve the problem. To do this apply both brakes again fairly quickly, as if to do a strong stall, then immediately release both brakes and damp out the surge forward in the normal way. The canopy will collapse behind you then automatically re inflate and surge forward in front of the pilot before returning to normal flight. It is the surge forward that exits the canopy from deep stall.

Spin

This manoeuvre is dangerous and should not be practised in the course of normal flying. Spins occur when the pilot tries to turn too fast. In a spin the pilot, lines and canopy basically stay vertical and rotate around a vertical axis. The Tandem 2 will resist spinning, but if a spin is inadvertently induced the pilot should release the brake pressure but always be ready to damp out any dive as the glider exits the spin. If the pilot does not damp the dive on exiting the spin the glider may have an asymmetric deflation.

Asymmetric Front Deflation

The Tandem 2 is very resistant to deflations, however if the canopy collapses on one side due to turbulence, then first of all control the direction of flight by countering on the opposite brake, then pump the brake on the collapsed wing. The pumps on the brake should be long, strong, smooth and firm. Normally one or two pumps of around 80 cm will be sufficient. Each pump should be applied in about one second and smoothly released. In severe cases it can be more effective to pump both brakes together to get the canopy to re inflate. Be careful not to stall the wing completely if this technique is used.

Releasing a trapped tip

On the Tandem 2 it should be very difficult to trap so that it will not come out quickly. However in extreme conditions all canopies can become tied up in their own lines following a very severe deflation. If this occurs then first of all use the standard method of recovery from a tip deflation as described in 'Asymmetric Front Deflation' above. If the canopy will still not recover then pull the rear risers to help the canopy to re inflate or even the B risers. Strong brake application will also help to release a trapped tip. A full stall can also release a trapped tip but should only be tried as a last resort if a part of the wing becomes really knotted in the lines, and only if you have practiced the full stall during SIV training. Recovery should only be attempted with sufficient height. If you are very low then it is much more

important to steer the canopy into a safe landing place or even throw your reserve.
NOTE: Test pilots have tested the Tandem 2 well beyond the normal flight envelope, but such tests are carried out in a very precise manner by trained test pilots with a back-up parachute, and over water. Stalls and spins on any paragliders are dangerous manoeuvres and are not recommended.

Chapter VI

Storage & Servicing Packing

a) Select a suitable flat area that is out of the wind if possible

b) Arrange the canopy with the underside facing upwards and the harness at the trailing edge. All the lines should be lying on the canopy. At this stage you may wish remove your harness.
c) Roll up the canopy in sections from each tip inwards.

d)Then starting from the harness at the trailing edge roll up the canopy squeezing out all the air at the same time.
e) The rolled canopy will now fit neatly into its bag.

Storage & Care

a) If you have to pack away your canopy wet, do not leave it for more than a few hours in that condition. As soon as possible dry out the canopy. Do not use direct heat sources to dry canopy as it is inflammable.
b) Always store the canopy in a dry warm place. Ideally this should be in the temperature range of 5 to 3 degrees centigrade.
c) Never let your canopy freeze, particularly if it is damp.

d) The Tandem 2 is made from high quality nylon which is treated against weakening from Ultra Violet radiation. However it is always wise to minimise the exposure to U.V. radiation as this weakens the fabric of the canopy, and long exposure to harsh sunlight can severely compromise the safety of your canopy.

Therefore once you have finished flying put away your canopy. Do not leave it laying in strong sunshine unnecessarily.
If you are concerned about the strength of your paraglider please contact your nearest Airwave dealer or talk to Airwave direct.
e) Do not treat your canopy with chemical cleaners or solvents. If you must wash your chute use warm water and a little soap. If your canopy gets wet in sea water, wash it with warm water and carefully dry it.
f) Small tears in the top or bottom surface (not normally the ribs) of a canopy can be repaired with a patch of self adhesive spinnaker nylon.
Tears no longer than 100 mm can be repaired in this way providing they are not

in a high stress area. If you have any doubt about the airworthiness of your canopy please contact your dealer or Airwave directly.

Servicing

It is important to have your glider regularly serviced.

Your Tandem 2 should have a thorough check every year or every 200 flights, which ever is the earliest. Airwave and many of Airwave's dealers and distributors offer an inspection service. This is a comprehensive service which checks line lengths and strength, fabric porosity and tear strength and a variety of other tests and we strongly advise all pilots to take advantage of this.
Please ensure you return this manual with your glider with the number of flights and hours flown written in the Certificate of Service.

NB. The manufacturer will only accept responsibility for paraglider lines and repairs where the manufacturer has produced and fitted such lines or carried out repairs.

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